

BIOMAGNIFICATION OF POLYCHLORINATED BIPHENYLS THROUGH A RIVERINE FOOD WEB

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(Received 29 April 1996; Accepted 2 December 1996)

Abstract—From 1989 to 1993, biota collected from Pottersburg Creek, London, ON, Canada were analyzed for total polychlorinated biphenyls (PCBs) and lipids. Data were analyzed by analysis of covariance (ANCOVA) with lipid as the covariate, to investigate station, time, and trophic effects on PCB accumulation in aquatic organisms. All three variables were highly significant ($p < 0.0001$). PCB concentrations in biota decreased along the length of the creek away from the point source. PCB concentrations in biota collected in July 1993 were not significantly different from concentrations in biota collected in July 1990 ($p > 0.16$), suggesting that sources into the creek have not been alleviated. The relationship between PCBs and lipid for biota from Pottersburg Creek suggests that organisms accumulate PCBs relative to their position in the food web ($p < 0.0001$). Fish and leeches occupying the top of the food web accumulated more PCBs than organisms occupying a lower trophic position (crayfish and oligochaetes/chironomids), indicating that biomagnification through trophic transfer (i.e., the uptake of a chemical through ingestion) is the primary mechanism governing contaminant levels in biota and not bioconcentration (i.e., the uptake of a chemical from water).

Keywords—Polychlorinated biphenyls PCBs Biomagnification Food web

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